Remarks

Claims 1-33 are pending. Claims 1-21, 25, and 27-29 stand rejected, while claims 22-24, 26, and 30-33 stand objected to. Claim 1 is amended herein. Applicants respectfully traverse the rejection and request allowance of claims 1-33.

Claims 22-24, 26, and 30-33 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants gratefully acknowledge the indication of allowability.

Claims 1, 3/1, 4, and 6-16 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Inasmuch as the rejection applies to the claims as amended, Applicants respectfully traverse the rejection.

The final Office Action asserts that: "The method is not tied to another statutory class (such as a particular apparatus) or transforms an underlying subject matter (such as an article or material). Thus, the method is not a patent eligible process under 35 USC 101 and is directed to non-statutory subject matter. See In re Bilski, Appeal No. 2007-1130."

The final Office Action, at page 8, implicitly acknowledges that the independent claim is tied to a particular machine, stating that: "Claim 1 is directed to a method of validating a flow calibration factor of a flow meter based on the stiffness of a component of the flow meter." But then, the final Office Action states that: "In claim 1, even though a possible calibration error condition is based on a vibrational response of the flow meter, neither the flow meter nor its component is transformed to a different state or thing. Thus, the physical transformation requirement is not met."

The final Office Action appears to be asserting that the method must transform the machine performing the method (see the above quote, wherein the final Office Action asserts that "neither the flow meter nor its component is transformed to a different state or thing"). This is nonsensical.

Independent claim 1 recites a method tied to a flow meter, an apparatus. Independent claim 1 recites "determining an initial flexural stiffness of a component of

said flow meter". Independent claim 1 recites "determining a current flexural stiffness of said component from a flow meter vibration produced in response to application of a predetermined force to one or more flow tubes of the flow meter". Therefore, independent claim 1 is already *tied to a particular machine*. There is no need for any transformation.

However, it should be understood that, in addition to being tied to a particular machine, method claim 1 performs a transformation of an article in the claim, as the claim recites that the "vibration produced in response to application of a predetermined force to one or more flow tubes of the flow meter" is transformed into a representative "current flexural stiffness."

The "transformation" comports with Bilski, which discussed what comprises a transformation of an article in a claim. The Federal Circuit in Bilski elaborated on the transformation test by citing In re Abele, stating that:

> [W]e held one of Abele's dependent claims to be drawn to patent-eligible subject matter where it specified that 'said data is X-ray attenuation data produced in a two dimensional field by a computed tomography scanner.' Abele, 684 F.2d at 908-09. This data clearly represented physical and tangible objects, namely the structure of bones, organs, and other body tissues. Thus, the transformation of that raw data into a particular visual depiction of a physical object on a display was sufficient to render that more narrowly-claimed process patent-eligible.

In re Abele, 684 F.2d 902 (CCPA 1982) at 908-09. The Federal Circuit in Bilski further stated that the **data** in question in Abele "clearly **represented** physical and tangible objects" and that "the electronic transformation of the data itself into a visual depiction in Abele was sufficient; the **claim was not required to involve any transformation of the underlying physical object that the data represented**." (emphasis added).

Therefore, Abele stands for the proposition that non-physical objects, such as electronic data, can be the subject of the transformation.

Applicants reiterate that the method of claim 1 transforms a vibrational response of the flow meter into a calibration error condition that indicates a possible calibration error in the flow meter. The calibration error condition can reflect physical flow meter

conditions such as erosion, corrosion, coating, changing pipeline mountings, or changing temperature, for example (see page 2, lines 14-18).

Claims 1-5, 9, 11-13, 17-21, 25, and 27-29 stand rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,092,409 to Patten et al in view of the printout from Answers.com ("Answers"). Applicants respectfully traverse the rejection.

Independent claims 1 and 17 require determining a current flexural stiffness of a component of a flowmeter. Claims 1 and 17 further require comparing the initial flexural stiffness to the current flexural stiffness and detecting a calibration error condition responsive to comparing the initial flexural stiffness to the current flexural stiffness. Claim 1 requires that the current flexural stiffness is determined from a flow meter vibrational displacement.

Patten discloses measuring a period of oscillation (T) (see abstract) and using the measured oscillation period to calculate the density of the fluid, using $\rho \approx (1/f)^2$. The calculated density is obtained using a known calibration fluid, wherein the calculated density is compared to a known density of the calibration fluid in order to detect a variation. Patten therefore discloses using the calculated density to detect a possible error condition in the flowmeter (see abstract) by detecting an anomaly in density measurement. However, Patten **requires** using a calibration fluid of known density in the flowmeter in order to obtain the current measured density (see abstract; see col. 2, lines 51-53; see col. 8, lines 38-66). It is clear from the text of Patten that Patten cannot operate except on a calibration fluid of a known density.

Patten does not quantify or determine a flexural stiffness. Patten does not compare a flexural stiffness. Patten does <u>not</u> teach or suggest that the error might be a flexural stiffness error. Patten never discusses flexural stiffness.

The Office Action concedes that Patten "does not disclose determining/comparing the flexural stiffness of the flowmeter component." The Office Action therefore provides the Answers document and alleges that Answers couples stiffness to frequency and further alleges that it would have been obvious to combine Patten and the Answers document.

Answers couples an angular vibrational frequency (ω_0) of an undamped system to the mass m and stiffness s. The zero subscript denotes that the equation determines a "natural" or "resonant" frequency as a function of the two given factors. The equation of Answers merely denotes a natural frequency that will depend on the mass and stiffness of a vibrating mechanical system.

While Answers discloses a relationship between resonant frequency and stiffness, as used in a general manner, there is no teaching or suggestion in Answers as to why a calculation of stiffness would be useful. Neither Patten nor Answers suggests determining stiffness as a way of validating a Flow Calibration Factor. Instead, Patten teaches a FCF validation method using **density** measurements performed on a calibration fluid.

Neither Patten nor Answers discloses determining flow meter stiffness. The mere recitation of the relationship of stiffness and frequency in a mathematical formula does not comprise a suggestion to use the vibration frequency of Patten to generate a stiffness value. The combination of Patten and Answers does not disclose storing an initial flexural stiffness. Further, the combination of Patten and Answers does not disclose generating a flow meter stiffness value for the purpose of comparing to an initial flexural stiffness.

There is no teaching, suggestion, or motivation to combine Patten and Answers. Answers discusses the general concept of damping. The equations and discussion in Answers is for the purpose of explaining damping. Answers does not discuss flow meters. Answers does not discuss measuring flow rate of a fluid, wherein the resonant frequency of the apparatus will change according to changes in the fluid. Answers does not apply to a flow meter where the driven vibrational frequency may or may not take into account a meter stiffness or a meter stiffness including a flow material therein.

The final Office Action asserts that dependent claims 4 and 20 "discloses said oscillation periods are determined by solving a single degree of freedom model (measurement of oscillation, column 1, lines 34-35, using sensors, column 1, lines 42-46)."

This is incorrect. The first portion of cited text states that: "A driver applies a force to the flow tube. The force causes the flow tube to oscillate." (see col. 1, lines 34-35). The second portion of cited text states that: "Sensors are placed at two different points on the flow tube to produce sinusoidal signals representative of the motion of the flow tube at the two points. A phase difference of the two signals received from the sensors is calculated in units of time." (see col. 1, lines 42-46).

The cited text, and indeed all of Patten, does not disclose use of a model for interpreting/processing vibrational signals received from two pick-off sensors. Patten merely receives vibrational measurements and generates a phase difference (and possibly a frequency value) therefrom. Nowhere in Patten are the terms "model", "degree of freedom", "flexural stiffness", "flexural", or "stiffness" ever used. A text search was performed to verify this. Patten merely discloses vibrating a flowtube structure and determining flow characteristics from the vibrational response at two points on the flowtube structure.

Independent claims 1 and 17 therefore include features that are neither taught nor suggested by Patten. Dependent claims 2-5, 9, 11-13, 18-21, 25, and 27-29 are allowable for the same reasons as claims 1 and 17.

Applicants respectfully request allowance of claims 1-33. Please feel free to call to discuss the patentability of the pending claims.

Date: 8/6/09

Gregg Jansen
SIGNATURE OF PRACTITIONER

Gregg Jansen, Reg. No. 46,799
The Ollila Law Group LLC
Telephone: (303) 938-9999 ext. 14
Facsimile: (303) 938-9995

Correspondence address: **CUSTOMER NO. 32827**